### Health Effects of Methylmercury

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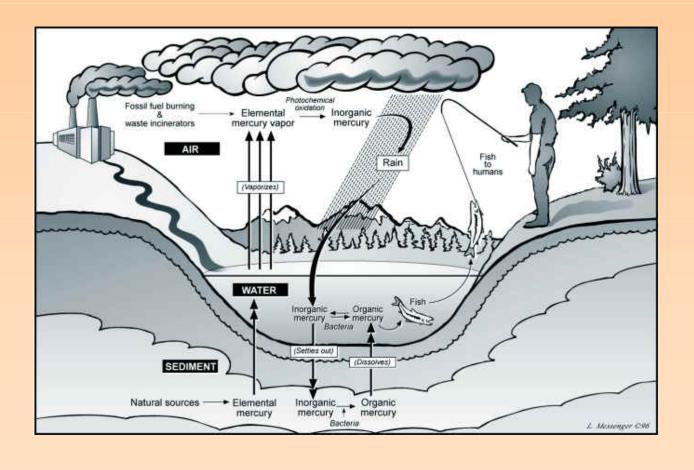
WI Division of Public Health

# Mercury Species

- Inorganic Mercury
  - Elemental Hg<sup>0</sup>
  - Ionic Hg<sup>+2</sup>

- Organic
  - Methylmercury CH<sub>3</sub>Hg
  - Ethylmercury, thimerosal CH<sub>2</sub>Hg







### Case Studies

Minamata Disease

Iraqi Poisonings

New Zealand Study

Finnish Fishermen Study

Faroes Island and Seychelles studies



### Minamata, Japan - 1956

- >1,000 people affected
- Numbness, slurred speech, unsteady gait, tunnel vision, & behavioral changes
- Many children were born with cerebral palsy and severe mental retardation
- 'Cat dancing disease' in domestic cats



- Illnesses linked to mercury contaminated fish
- Chisso Corporation discharged tons of mercury into the Minamata Bay between 1930-1960
- Japan banned the sale of fish from the bay
- Chisso Corp diverted waste to the Minamata river
- Within months illnesses began to occur in the river town of Hachimon.



### Features of Minamata Disease

- All patients lived near Minamata Bay
- Most were fishermen and their families
- All ages affected except infants
- Men affected more than women
- No regular interval between onset within a home
- Death rate was high
- Vegetables and water ruled out
- Every patient had eaten fish and seafood
- Many cats with same symptoms

### Victim of Minamata Disease

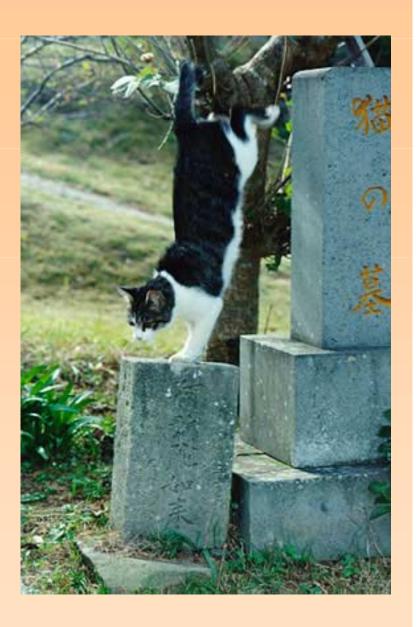


### Memorial to Minamata Victims





# Monument to the cats of Minamata Japan

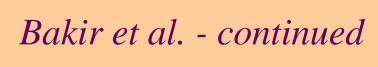




# Methylmercury Poisoning in Iraq

by Bakir, et al.

"The primary signs and symptoms of methylmercury poisoning result from damage to the nervous system and are characterized by loss of sensation at the extremeties of the hands and feet and in areas around the mouth (paresthesia), loss of coordination in gait (ataxia), slurred speech (dysarthria), diminution of vision and loss of hearing."



- "Severe poisoning can cause blindness, coma and death."
- "There is a <u>latent period</u> of weeks or months between exposure and the development of .. symptoms."
- "Ataxia may decrease, but general recovery is poor."
- "Prenatal exposure ... has resulted in mental retardation and cerebral palsy."



#### Bakir, et al. continued

- "This epidemic is the most catastrophic ever recorded in terms of its extent and its ensuing morbidity and mortality."
- '6,530 cases were admitted to hospitals and there were 459 hospital deaths'
- Rural families were exposed when they ate bread made with fungicide-treated wheat.

New Zealand Study

Smaller study of 237 children

Ethnically diverse study population

Maternal hair mercury levels associated with lower test scores in children

### Seychelles Study

Study of 779 mother/infant pairs No effects seen. Why?

Chance? 70% power to see an effect
Test methods might be less sensitive
Timing of maternal hair collection
Age of children at testing
Healthy population/excellent medical care
Diet rich in antioxidants and other nutrients

Faroes Islands Study

Ongoing study of 900 children

Developmental delays and blood pressure changes associated with cord blood Hg

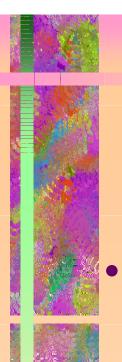
Possible confounding by PCB exposure among families that consumed whale blubber



# Finnish Fisherman Study

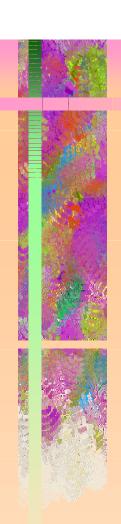
- Study of 1,833 fishermen aged 42-60
- "These data suggest that a high intake of mercury from non-fatty freshwater fish and the consequent accumulation of mercury in the body are associated with an excess risk of AMI as well as death from CHD, CVD, and any cause in Eastern Finnish men..."

Salonen, et al. Circulation, 1995



# Conclusions of the National Academy of Sciences

- Prenatal exposure to mercury can cause developmental delays
- The effects on the aging nervous,
   cardiovascular, immune and endocrine
   systems should be evaluated
- EPA and FDA should take action to reduce Hg exposure in the U.S.



### What can we do?

- Reduce our use of mercury
  - Thermometer replacement programs
  - Mercury reduction in schools
- Keep mercury out of the waste stream
- Reduce industrial emissions
- Provide information to consumers of freshwater and ocean fish